The Impact of Minimum Wage on Body Mass Index in Canada

by

Christine Truong

An essay submitted to the Department of Economics

in partial fulfillment of the requirements

for the degree of Master of Arts

Queen's University

Kingston, Ontario, Canada

August 2016

Abstract

This paper uses variation in real minimum wage to test whether fast food consumption plays a role in increasing body weight. By using Canada Community Health Survey (CCHS) data from 2001 to 2014, I extend the work of Meltzer and Chen (2011) in two important ways. First, my data is more recent than the earlier analysis, and allows me to distinguish the effects of fast food consumption on body weight before, during and after the Harper government. Second, I focus on Canada, while Meltzer and Chen focused on the United States. While Meltzer and Chen found a negative causal relationship between real minimum wage and BMI levels for the US between 1984 and 2006, I do not find a similar effect in Canada at any time from 2001 to 2014. Prior to the Harper government (2007-2014), the results show an insignificant negative relationship between real minimum wage and BMI levels. During the Harper government, the results show a significant positive relationship between real minimum wage and BMI levels, the opposite effect from the earlier US study. The recessionary effects during the Harper government, the impact of minimum wages on food prices and the household budget constraint may explain the differences in results.

Acknowledgement

I would like to express my sincere gratitude to my supervisor, Professor Christopher Cotton for his availability, and helpful feedback during the writing of this paper. I am thankful to all the Department faculty and staff members for their help and understanding. I would also like to thank my parents for all their support, no words can express my appreciation. Special thanks to the friends I have met at the QED for making this experience enjoyable and memorable. Finally, a warm thanks to my significant other, Jason Yarde for his patience, encouragement and sympathetic ear during this challenging endeavor.

Table of Contents

I. Introduction

Obesity is a growing public health concern and the rate of obesity in Canada has tripled since 1985. In 2014, Canada was ranked the fourth highest in obesity prevalence with a measured level of 25.4 percent compare to the OCED average of 18.4 percent (see Twells et al. 2014; Organization for Economic Co-operation and Development 2014). There are several determinants that cause and contribute to the obesity epidemic. Popular determinants include physical activity, diet choices, socioeconomic status, environmental factors, and ethnicity, all interconnected making it difficult to fully understand the underlying factors that contribute to obesity. Socioeconomic and environmental determinants shape the ability for individuals to make healthier decisions. Independent of these, weight gain is a consequence of an increase caloric intake and a decrease in caloric expenditure.

In the past decades, technological changes have contributed to the unbalanced caloric ratio where caloric intake exceeds caloric expenditure. The shift in technology has led to less physical demanding labour supply and growth in inactive leisure activities such as video games and the internet has contributed to a sedentary lifestyle (Philipson and Posner 1999). Predominantly, technological changes enable food engineering and mass food productions creating heavily processed foods that maximize food palatability, lowers food prices and increases high calorie processed food consumption (see Cutler , Glaeser and Shapiro 2003; Drewnowski 1995). Ruhm (2012) made an interesting observation that

technological innovations began around the 1970's, roughly the same time obesity began to rapidly increase.

A common type of processed food is fast food and popular opinion suggests that fast food is a strong contributor to the rising rate of obesity. It is difficult to empirically establish a causal link between fast food and obesity. First, both fast food restaurants and obesity have increased over the years and this reason is insufficient to support this causal link. Secondly, individuals that consume more fast food may partake in other behaviours that affect obesity. The literature on the proximity of fast food restaurants and obesity is mixed. People living close to fast food restaurants are more likely to be obese (Chou, Grossman and Saffer 2004). Currie, et al. (2010) explore how the supply of fast food affects obesity levels of children and pregnant women. Their findings suggest that the closer in proximity teenagers and pregnant women are to fast food restaurants the more likely they will be obese, and non-fast food restaurants are uncorrelated with weight outcomes. Other literature found that the proximity of fast food restaurants has an insignificant effect on obesity because consumers may offset their restaurant consumption by eating less at other times (Anderson and Matsa 2011).

Again, the findings may not reflect the causal effect of fast food restaurants on obesity. Jekanowski, Binkley and Eales (2001) states that the demand for fast food restaurants is heavily dependent on the demand for convenience. The authors suggest that the increasing demand for convenience has created a greater availability of fast food establishments contributing to increase consumption due to the decreasing cost of obtaining a meal. It is difficult to empirically establish a causal link between fast food

consumption and obesity. Meltzer and Chen (2011) hypothesized that changes in real minimum wage is associated with changes in body mass index (BMI) to establish a causal pathway between fast food consumption and obesity. They used data from the Behavioral Risk Factor Surveillance System from 1984 to 2006, and Bureau of Labour Statistics to test their hypothesis.

This paper replicates Meltzer and Chen's empirical analysis, examining the relationship between real minimum wage and body weight in Canada from 2001 to 2014. To my knowledge, prior studies have not examined this relationship in Canada. The results show an insignificant relationship prior to the Harper government, and a significant positive relationship during the Harper government. Possible explanation may be due to the effects of the recession over this period, policy changes implemented by the Harper government, the impact of minimum wage on food prices, and the household budget constraint.

The next section will summarize Meltzer and Chen's paper and relevant research pertaining to Meltzer and Chen's findings and on topics of minimum wage, fast food prices and obesity. We will also discuss what effects business cycles might have on minimum wage and obesity. Section 3 describes the empirical analysis, variables and data set used. The results are present in Section 4. I discuss and conclude the results in Section 5 and address some limitations in Section 6.

II. Literature Review

i. Meltzer and Chen

"The Impact of Minimum Wage Rates on Body Weight in the United States" by David O. Meltzer and Zhuo Chen is a 2011 study in the National Bureau of Economic Research book published by the University of Chicago Press. Meltzer and Chen (2011) suggested that variation in real minimum wage may provide a powerful tool for testing the hypothesis that fast food consumption may play a role in increasing obesity. The authors argue that this is a powerful mechanism because minimum wage labour contributes up to one-third of the cost of fast food, and real minimum wage accounts for state and federal level legislation while controlling for inflation. According to the Bureau of Economic Analysis, the labour cost (minimum wage) makes up about one-third of the cost of fast food. In the United States, if wages were to increase to $15 per hour, with no substitution effect, prices would go up by approximately 22 percent (Furchtgott-Roth 2015). Meltzer and Chen (2011) do not prove that the relationship is causal between minimum wage and obesity but rather an evidence of a causal pathway. The causal pathway described is that a decline in minimum wages may translate to lower fast food restaurants prices, increase food-away-from-home (FAFH) consumption, therefore increasing obesity.

Using data from the Behavioral Risk Factor Surveillance System from 1984 to 2006, Meltzer and Chen (2011) concluded a negative correlation where a one-dollar increase in minimum wage is associated with a 0.06 decrease in mean body mass index (BMI). The decline in real minimum wages contributed a 1-2% increase in BMI over the

course of the 22 years of their study. They provide three arguments defending their causal pathway. First, it's reasonable to assume the causal pathway does not run the other way. There is no reason to believe that obesity would influence minimum wage legislation or inflation. Second, it is possible that a third factor may cause both a decrease in real minimum wage and increase in BMI. One factor mentioned by the authors is falling incomes which could cause states to allow the minimum wage to drift downward and increase in obesity. The decline in socioeconomic status due to falling incomes may cause individuals to substitute foods with cheaper and more fattening alternative. Meltzer and Chen controlled for this possible factor by using a fixed effect model. Lastly, a decline in minimum wage also lowers the income of people who earn minimum wage. As a result, low-income earners may consume less healthy food options, contributing to a rise in obesity.

ii. Minimum wage, fast food prices, and obesity

There are studies that support and question Meltzer and Chen's hypothesis. Literature have examined the relationship between minimum wage and fast food prices, and fast food prices and body weight. Comparing different restaurant establishments, Aaronson, French and MacDonald (2008) concluded that in competitive labour markets, restaurant prices do increase after minimum wage increases. Since limited service restaurants[1] are more likely to pay minimum wage, they show larger increases in their restaurant food prices. In addition, restaurant prices respond quickly to minimum wage

[1] Aaronson, French, and Macdonald (2008) refer to fast food restaurants as limited-service resturants which includes Mcdonald, Burger King compare to full service restaurants.

increase: most restaurants increase their food prices within two months after the implementation of minimum wage increases (MacDonald and Aaronson 2006). Macdonald and Aaronson (2006) also found that restaurant prices increased more in fast food restaurants that rely more on low-wage labour than high-wage labour. This finding is interesting because restaurant prices tend to have long price duration and infrequent changes went it comes to general cost shocks. Data from Canada and the United States also support this finding and found no price response leading up to the wage increase (Aaronson 2001).

Price changes affects the demand for food. Comparing elasticity between food-away-from-home (FAFH) and food-at-home (FAH), Piggott (2003) found that FAFH is more price and income elastic compare to FAH which is price and income inelastic. Controlling for demographic, lifestyle, and regional factors, Binkley, Eales and Jekanowski (2000) found that increased consumption of FAFH, in particular fast food is associated with increased obesity. In addition, increased fast food consumption is associated with higher BMI levels, and the increased probability of being overweight (see French, Harnack and Jeffery 2000; Bowman and Vinyard 2004). Higher fast food prices are also associated with lower weight outcomes among adults and lower BMI and obesity among adolescents (see Chou, Grossman and Saffer 2004; Chou, Rashad and Grossman 2008).

Cotti and Tefft (2013) used the changes in minimum wage to examine whether the exogenous changes in fast food prices impact BMI at an individual level among adults. The authors concluded that an increase in minimum wage leads to an increase in fast food

prices, and a one-dollar increase in fast food prices is associated with a 0.08 BMI decrease and 0.06 percent decrease in the probability of being obese. However their finding is only significant at a 10% level which suggests little significant evidence supporting that fast food prices affect adult BMI or obesity prevalence. The literature is conflicting and challenges Meltzer and Chen's causal pathway.

Meltzer and Chen (2011) concluded that minimum wage affects higher-income earners more than lower-income earners. The authors claim that this supports their causal pathway because higher income people are more likely to spend on FAFH and have shown the most weight gain in the recent years. This is not convincing because the literature on FAFH spending among different income level is mixed, and higher spending on FAFH may not result in higher caloric intake. Kirkpatrick and Tarasuk (2003) concluded that low-income households purchase less healthy foods (fruits and vegetables) than high-income households, and low-income households spend less on FAFH than high-income households. Whereas, Kpelitse, Devlin and Sarma (2014) found that a 1% increase in income leads to a 0.76% and 0.27% decrease in the probability of being obese for women and men respectively. Another study found different results among gender and race groups. For example, Chang and Lauderdale (2005) found a strong inverse relationship between income and obesity among non-Hispanic white women. Whereas, among non-Hispanic black men, higher- income individuals tend to have higher BMI.

FAFH is a contributing factor to a poor diet, but FAFH may not result in higher caloric intake compare to FAH. After controlling for individual differences such as dietary awareness and food preferences, Todd, Mancino, and Lin (2010) found that

people choose to eat less healthy foods when eating away from home. On average, the number of vegetable servings during dinner were reduced when eating away from home, and calories increased eating breakfast and lunch meals away from home. At the same time, their findings suggest that individuals may not compensate less healthy FAFH with healthier food choices at home. It is also possible that FAFH can be part of a healthy and affordable diet when carefully selected (Wen, et al. 2009).

iii. Business cycles

Economic conditions can affect employment, wage and people's behaviours towards health. Business cycles may be a possible third factor affecting both minimum wage and obesity. Literature suggests a cyclical behavioral shift of real wages from countercyclical during the interwar period (1918-1939) to a pro-cyclical during the postwar period (after WWII 1939-1945) (see Hanes 1996; Barsky and Solon 1988; Solon, Barsky and Parker 1994; Phaneuf, Liu and Huang 2004). Hanes (1996) argues that real consumption wages have became more pro-cyclical over time due to the change in consumption goods that make up the household's budget. Ceteris paribus, real consumption wages should tend to be more pro-cyclical when consumption goods are more finished (goods undergoes more production stages) versus less finished goods (e.g. fuel, or unprepared food items).

However, most of the literature on cyclical real wages are based on the U.S. economy. Messina, Strozzi, and Turunen (2009) examine aggregate real wages in the manufacturing sector over business cycles across a large sample of OECD countries for

more than 40 years starting from the 1960s. Their results showed that countries like Germany, U.S, U.K, and Japan with pro-cyclical real wages also display pro-cyclical employment. Whereas countries like Ireland, Spain, New Zealand, and Canada with countercyclical real wages display different degrees of cyclical employment. Overall their evidence suggests that real wages tend to be less procyclical (or more countercyclical) with countries with more open economies and stronger unions.

Since 1975, the average real minimum wage in Canada has varied between $7 to $11 per hour[2]. Real minimum wage has stayed under $8 since the mid-1980s, and only started increasing in 2005 to roughly $10 in 2013 (Galarneau and Fecteau 2016). The credit bubble burst that occurred in the U.S. in August 2007 set off a chain of events in the global economy. Canada's economy began to soften in December 2007, with Canada officially entering into a recession in October of 2008, ending in May 2009 (Cross and Bergevin 2012). Consistent with Messina, Strozzi, and Turunen (2009), Canada's real minimum wages are countercyclical displaying pro-cyclical employment during the Great Recession. Real wages increased roughly from $9.20 to $9.50 (2014 Canadian dollars) between 2008 to 2009.[3] Between that same time, employment rate in Canada decreased from 63.5% to 61.5%[4] and inflation dropped from 2.37% to 0.31%[5].

[2] Refer to Figure 3 for full trend of Canada's average real minimum wage between 1975 to 2013.

[3] Real wages were calculated using nominal wages from the Government of Canada (2014) and CPI from Statistics Canada (2016)

[4] See Statistics Canada. 2016. *Table 282-0087 - Labour force survey estimates (LFS), by sex and age group, seasonally adjusted and unadjusted, monthly (persons unless otherwise noted).* May 8. http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=2820087&&pattern=&stByVal=1&p1=1&p2=37&tabMode=dataTable&csid=.

[5] See Worldwide Inflation Data . 2016. *Historic inflation Canada - CPI inflation.* http://www.inflation.eu/inflation-rates/canada/historic-inflation/cpi-inflation-canada.aspx.

The literature examining the relationship between business cycles and obesity is mixed. Studies look at the unemployment rate during economic conditions, and how unemployment affects physical activity. Colman and Dave (2013) examine the consequences of physical activity on weight–based health and heart-related morbidity. Their results suggest that reduced physical activities can explain 3-10% increase in BMI and 2-8% increase in diabetes and heart disease. Literature studying the impact of business cycles on physical activity suggest that physical activity is counter-cyclical, where physical activity increases during a recession and decreases during an expansion (see Ruhm 2000; Ruhm 2005; Dustmann and Windmeijer 2000; Zhang, Lamichhane and Wang 2014). Ruhm (2005) suggest that during an economic downturn, leisure physical activity increases and body weight decreases among the severely obese.

However, a Finland study using micro data between 1978 to 2002 found the opposite conclusion, that good economic conditions lead to a decrease in obesity (Böckerman, et al. 2004). During the Great Recession, increases in unemployment does encourage leisure physical activity, however total physical activity decreased due to a large decrease in physically demanding labour (Colman and Dave 2011). During the 2007 recession in Canada, some of the largest layoffs came from the manufacturing, and construction sectors (Tapp 2009). The decrease in physically demanding labour may partly explain the rise in obesity rates in Canada.

Obesity is influenced not only by caloric expenditure but also by caloric intake. Studies have also examined eating habits during economic conditions. Dave and Kelly

(2012) examined the relationship between unemployment and eating habits and concluded a one percent increase in unemployment is associated a 2-4% decrease in fruits and vegetable consumption. According to an article in the Economist (2012), Britons purchased less fresh fruits, vegetables, and meat, and purchased more food options that are unhealthy such as pizza, chocolate, and unhealthy ready based meals during the Great Recession. This may partly explain the weight gain during hard economic times. A study using individual-level longitudinal data from Iceland found that fruit consumptions declined during the 2009 recession but increased past pre-recession level during recovery (Ásgeirsdóttir, et al. 2016). The authors found that health compromising behaviours such as sugared soft drink, fast food, and sweets consumption also declined during the recession, but only sweets consumption reversed and increased during post-crisis. It seems unlikely that business cycles is a third factor influencing both minimum wage and obesity.

III. Theoretical Framework and Data

i. Methodology

This paper extends the analysis of Meltzer and Chen (2011) by examining the effect of real minimum wage changes among the participants' body mass index (BMI) using data available from the 2001-2014 Canada Community Health Survey (CCHS). CCHS was not conducted in 2006. I examined the relationship over three time periods; 2001 to 2014, 2001 to 2005 and 2007 to 2014. Coincidently, the CCHS was not conducted in 2006, the same year that Stephen Harper became Prime Minister. Thus, the 2007 to 2014 data is that from the Harper Government. I used a fixed-effect linear

regression models to examine the changes of real minimum wage associated with the changes in BMI. Our analysis uses BMI as the dependent variable, real minimum wage as the independent variable, with controlled variables: age, marital status, income, education, race, and gender. BMI data collected in the CCHS was self-reported, due to the expensive cost of collecting measured data.

There is reporting bias when it comes to using self-reported data, which may distort the regression results. Gorber, et al. (2008) address the reporting bias present in self-report BMI data by comparing self-reported height and weight to measured height and weight in the CCHS 2005. Consistent with past research, self-reported height is overestimated, and self-reported weight and self-reported BMI are underestimated. The authors compare several regression models and recommends that regression model 4 [6] is the most parsimonious in determining measured BMI from self-reported BMI. To account for the reporting bias, I calculated measured BMI using regression model 4, and compared the results between self-reported BMI and measured BMI for any significant differences. There is a total of four regressions to compare the results between using self-reported BMI, self- reported BMI under robust assumptions, measured BMI and measured BMI under robust assumptions. Statistical analyses are perform using Stata software version 13.

[6] $BMI_{(measured)} = -1.08+1.08_{(BMI\ self\text{-}reported)}$ for males & $BMI_{(measured)} = -0.12+1.05_{(BMI\ self\text{-}reported)}$ for females. These regression models are used to determine the measured BMI from self-reported BMI.

ii. Data and Descriptive Statistics

CCHS is a cross-sectional survey that collects information related to health status, health care utilization and health determinants for the Canadian population (Statistic Canada 2015). Random participants were selected using Random Digit Dialing (RDD), and data was collected using the Computer-Assisted Personal Interviewing (CAPI) method. CAPI interviewers administer CCHS questionnaires to RDD participants via computer. The 2001-2005 CCHS includes 298,416 and 2007-2014 CCHS includes 525,722 valid interview records. Records with pregnant women, participants younger than 18 years old, missing information on body mass index, marital status, income, education, and race were excluded.

The summary statistics are presented in Table 1 & 2. The sample has approximately 50/50 ratio of males to females and approximately 80/20 ratio of non-obese to obese among both gender groups (Table 1). Over the whole study period, the average BMI is 26.38 for the full sample, 25.93 for females and 26.90 for males (Table 2). Between 2001 to 2014, real minimum wage ranges from $7.05 to $11.08 across provinces/territories(Table2). The average BMI ranged between 25.53 to 26.81, and average real minimum wage increased from $8.35 to $10.54 (2014 Canadian Dollars) (Figure 1).

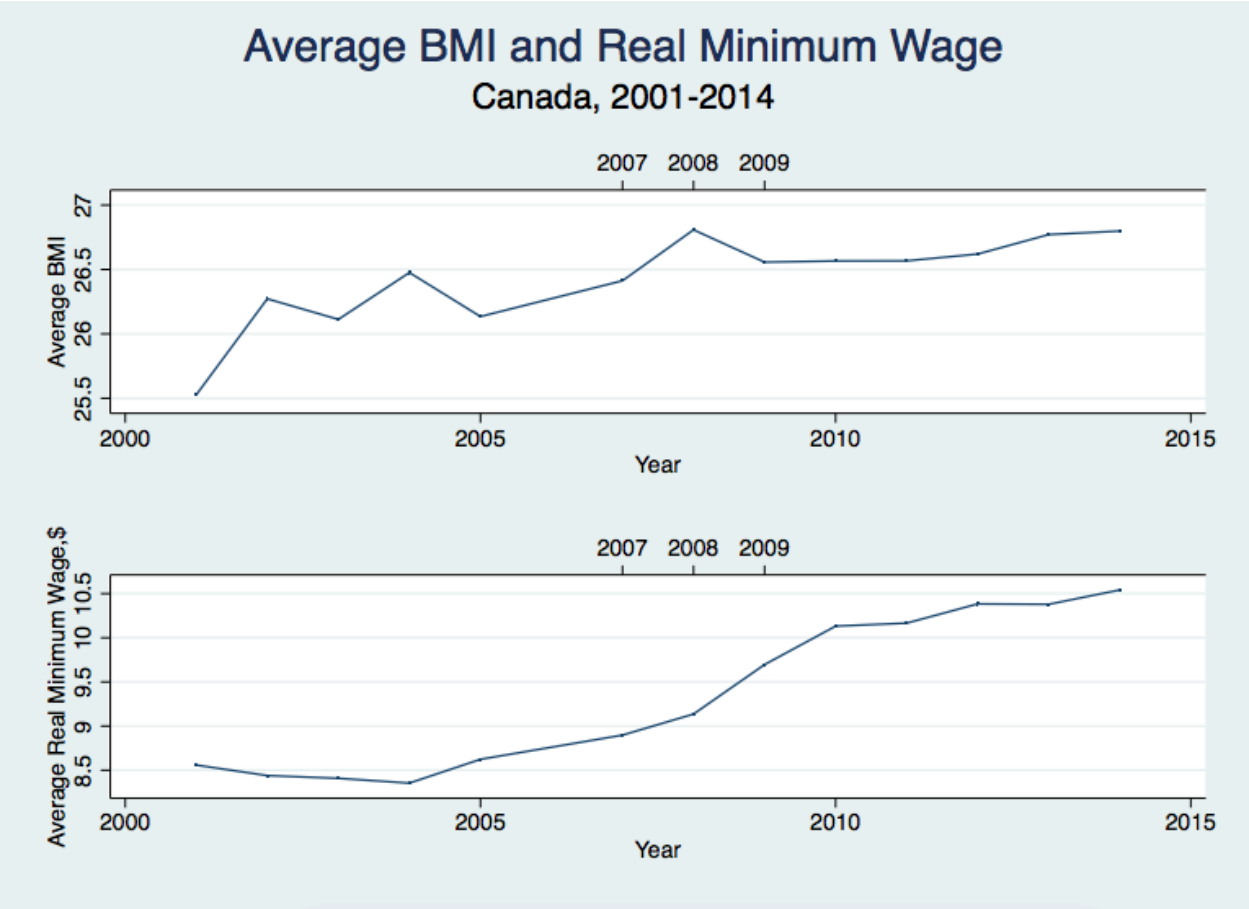
Table 1: Number of obese individuals by gender, 2001-2014

Obese (BMI ≥ 30)		Gender Male	Female	Total
Obese = 0	N	304,333	352,282	656,615
	%	46.35	53.65	100.00
	%	78.97	80.29	79.67
Obese = 1	N	81,021	86,502	167,523
	%	48.36	51.64	100.00
	%	21.03	19.71	20.33
	Total	385,354	438,784	824,138
		46.76	53.24	100.00

Table 2: Summary Statistic of every variable including mean, standard deviation, minimum, and maximum by gender between 2001-2014.

Gender	VARIABLES	(1) Mean	(2) Sd	(3) Min	(4) Max
Male	BMI	26.90239	4.571323	13.37	57.1
	Measured BMI	27.97458	4.937029	13.3596	60.588
	Real Minimum Wage	9.384848	.9643189	7.044847	11.07704
	Age	3.538082	1. 099267	1	5
	Marital Status	2.139943	1.274733	1	4
	Income	3.834697	1.336454	1	6
	Education	3.001528	1.230531	1	4
	Race	0.8573727	.3496928	0	1
	Gender (Male = 1)	1	0	1	1
Female	BMI	25.92828	5.528297	12.3	57.9
	Measured BMI	27.10469	5.804712	12.795	60.675
	Real Minimum Wage	9.412476	.9681916	7.044847	11.07704
	Age	3.635905	1.109689	1	5
	Marital Status	2.207949	1.191028	1	4
	Income	3.075652	1.220367	1	6
	Education	2.993616	1.226835	1	4
	Race	.8686484	.3377849	0	1
	Gender (Male = 1)	0	0	0	0
Total	BMI	26.38376	5.126307	12.3	57.9
	Measured BMI	27.51144	5.433686	12.795	60.675
	Real Minimum Wage	9.399558	.9664805	7.044847	11.07704
	Age	3.590165	1.105905	1	5
	Martial Status	2.17615	1.231343	1	4
	Income	3.43057	1.330981	1	6
	Education	2.997316	1.22857	1	4
	Race	.863376	.3434501	0	1
	Gender (Male = 1)	.4675843	.4989484	0	1

Figure 1: Average BMI and Average Real Minimum Wage, 2001 to 2014



Data Source: Government of Canada (2014) and Statistics Canada (2016)

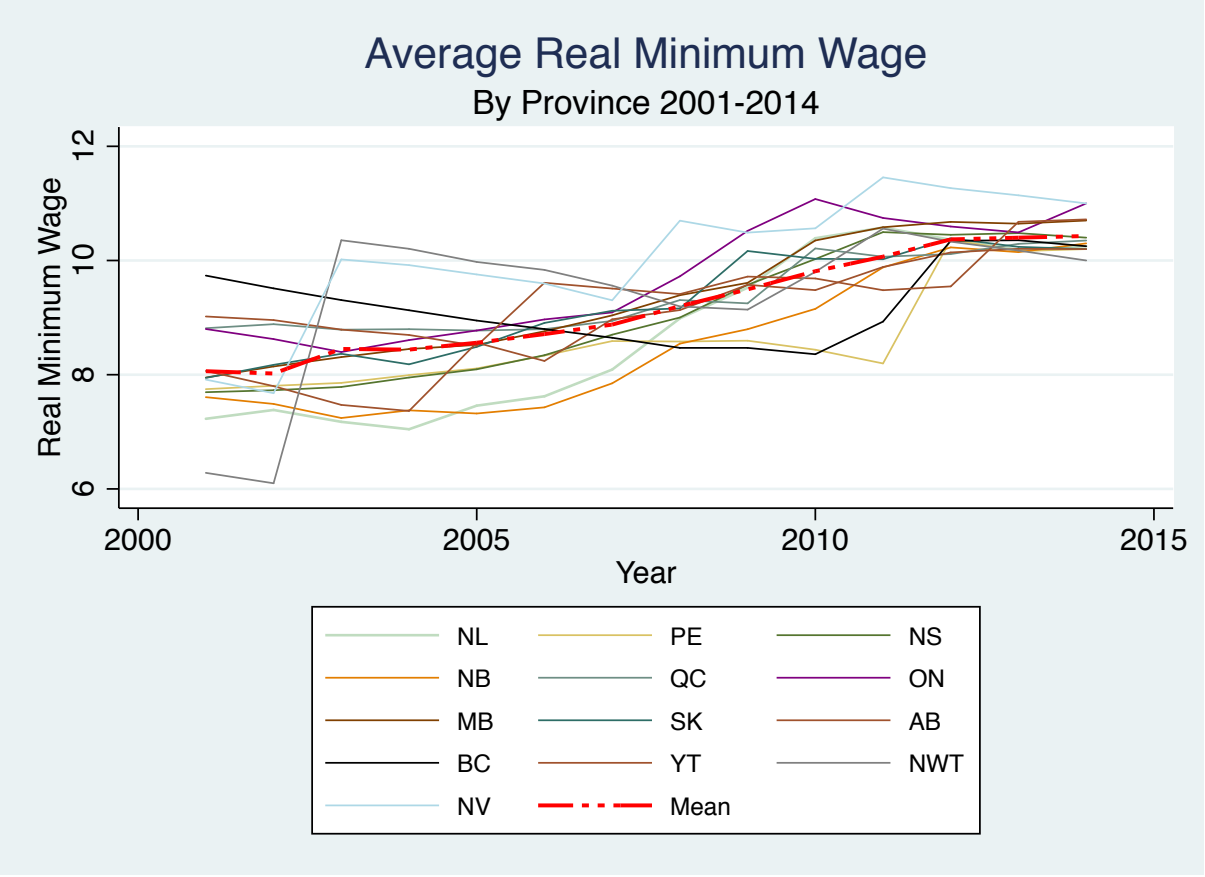
Provincial and Territorial hourly nominal minimum wage data are obtained from the Government of Canada's minimums wage database[7]. Provincial and territorial Consumer Price Index (CPI) were obtained from Statistics Canada[8]. Real minimum wage was calculated for each province and territory in 2014 Canadian dollars, by multiplying the nominal minimum wage from year i (where i = 2001 to 2014) by the 2014 CPI/ year i's CPI ratio. In 2014 Canadian dollars, Figure 1 (above) shows that between 2001 and

[7] Government of Canada. 2014. *Hourly Minimum Wages in CANADA for Adult Workers*. March 1. http://srv116.services.gc.ca/rpt2.aspx?lang=eng&dec=5.

[8] Statistics Canada . 2016. *Consumer Price Index, historical summary, by province or territory.* January 22.http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ150c-eng.htm.

2005 average real minimum wage stayed roughly under $8.50, then increasing by roughly $2 between 2005 to 2014 to $10.40. Most provinces and territories showed gradual increases in real minimum wage over the years. British Columbia is the only province where real minimum wage decreased between 2001 to 2010, and then increased between 2010 to 2014 (Figure 2). According to Galarneau and Fecteau (2016), the proportion of all paid employees earning minimum wage increased from 5% in 1997 to 6.7% in 2013, where most of the increase took place in between 2003 and 2010. In addition, almost a third of the paid employees earning minimum wage work in the food and service accommodation industry.

Figure 2: Average Real minimum wage in 2014 Canadian dollars, 2001 to 2014



Calculated from 2001 to 2014 nominal wage using 2001 to 2014 CPI.
Data Source: Goverment of Canada (2016) and Statistics Canada (2016)

IV. Regression Results

The four fixed - effects regression models examining the effects of real minimum wage on BMI is presented below. Table 3 contains the regression result between 2001-2014.

Table 3: Fixed–effects Regression 2001-2014

VARIABLES	(1) Self-reported BMI	(2) Self-reported BMI Robust	(3) Measured BMI	(4) Measured BMI Robust
Real Min Wage	0.310***	0.310***	0.330***	0.330***
	(0.00618)	(0.0345)	(0.00656)	(0.0367)
Martial Status (Base: Married)				
Common-Law	-0.225***	-0.225***	-0.239***	-0.239***
	(0.0201)	(0.0686)	(0.0213)	(0.0728)
Widow/Sep/Div	-0.251***	-0.251***	-0.270***	-0.270***
	(0.0151)	(0.0463)	(0.0161)	(0.0492)
Single/Never Mar	-0.353***	-0.353***	-0.382***	-0.382***
	(0.0160)	(0.0674)	(0.0170)	(0.0713)
Edu(Base:< than sec)				
Secondary Grad	-0.369***	-0.369***	-0.392***	-0.392***
	(0.0188)	(0.0307)	(0.0200)	(0.0325)
Other Post-Sec	-0.439***	-0.439***	-0.465***	-0.465***
	(0.0253)	(0.0712)	(0.0269)	(0.0755)
Post-Sec Grad	-0.679***	-0.679***	-0.721***	-0.721***
	(0.0160)	(0.0383)	(0.0170)	(0.0405)
Income(Base: NoInc)				
Less than $20,000	0.262***	0.262**	0.279***	0.279***
	(0.0338)	(0.0830)	(0.0358)	(0.0873)
$20,000 - $39,000	0.145***	0.145	0.159***	0.159
	(0.0338)	(0.0848)	(0.0358)	(0.0888)
$40,000 -$59,999	0.162***	0.162**	0.181***	0.181**
	(0.0344)	(0.0634)	(0.0365)	(0.0661)
$60,000-$79,999	0.212***	0.212**	0.236***	0.236***
	(0.0361)	(0.0669)	(0.0383)	(0.0701)
$80,000 or more	0.192***	0.192	0.218***	0.218
	(0.0375)	(0.116)	(0.0398)	(0.123)
Age (Base: 18-19yrs)				
20 to 34 Years	2.138***	2.138***	2.275***	2.275***
	(0.0456)	(0.0968)	(0.0484)	(0.103)
35 to 44 Years	3.051***	3.051***	3.246***	3.246***
	(0.0471)	(0.141)	(0.0500)	(0.150)
45 to 64 years	3.678***	3.678***	3.907***	3.907***
	(0.0462)	(0.138)	(0.0490)	(0.147)
65 Years Over	2.837***	2.837***	3.014***	3.014***
	(0.0472)	(0.0860)	(0.0501)	(0.0918)
Race	0.550***	0.550**	0.587***	0.587**
	(0.0166)	(0.214)	(0.0176)	(0.227)
Male	0.993***	0.993***	0.888***	0.888***
	(0.0118)	(0.0731)	(0.0125)	(0.0736)
Constant	19.98***	19.98***	20.78***	20.78***
	(0.0807)	(0.273)	(0.0856)	(0.292)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The result on the full sample between 2001-2014 suggest that a one-dollar increase in real minimum wage is associated with a 0.310 increase in mean self-reported BMI or a 0.330 increased in mean measured BMI. The results between self-reported BMI and measured BMI regression is small. Table 4 contains the results between 2001-2005.

Table 4: Fixed- Effects Regression, 2001-2005

VARIABLES	(1) Self-reported BMI	(2) Self-reported BMI Robust	(3) Measured BMI	(4) Measured BMI Robust
Real Min Wage	-0.0318	-0.0318	-0.0349	-0.0349
	(0.0348)	(0.219)	(0.0370)	(0.233)
Martial Status (Base: Married)				
Common-Law	-0.259***	-0.259***	-0.274***	-0.274***
	(0.0320)	(0.0543)	(0.0340)	(0.0577)
Widow/Sep/Div	-0.238***	-0.238***	-0.257***	-0.257***
	(0.0244)	(0.0644)	(0.0259)	(0.0683)
Single/Never Mar	-0.432***	-0.432***	-0.466***	-0.466***
	(0.0247)	(0.0604)	(0.0262)	(0.0641)
Edu(Base:< than sec)				
Secondary Grad	-0.452***	-0.452***	-0.480***	-0.480***
	(0.0290)	(0.0380)	(0.0307)	(0.0406)
Other Post-Sec	-0.532***	-0.532***	-0.563***	-0.563***
	(0.0374)	(0.0535)	(0.0397)	(0.0569)
Post-Sec Grad	-0.715***	-0.715***	-0.759***	-0.759***
	(0.0245)	(0.0414)	(0.0260)	(0.0439)
Income(Base: NoInc)				
Less than $20,000	0.195***	0.195**	0.207***	0.207**
	(0.0485)	(0.0760)	(0.0515)	(0.0798)
$20,000 - $39,000	0.0477	0.0477	0.0549	0.0549
	(0.0485)	(0.0884)	(0.0515)	(0.0925)
$40,000 -$59,999	0.154***	0.154*	0.173***	0.173*
	(0.0488)	(0.0826)	(0.0518)	(0.0867)
$60,000-$79,999	0.304***	0.304**	0.336***	0.336**
	(0.0513)	(0.120)	(0.0545)	(0.128)
$80,000 or more	0.227***	0.227	0.258***	0.258
	(0.0595)	(0.149)	(0.0631)	(0.159)
Age (Base: 18-19yrs)				
20 to 34 Years	1.825***	1.825***	1.940***	1.940***
	(0.0923)	(0.0940)	(0.0980)	(0.101)
35 to 44 Years	2.473***	2.473***	2.628***	2.628***
	(0.0938)	(0.114)	(0.0996)	(0.122)
45 to 64 years	3.238***	3.238***	3.436***	3.436***
	(0.0934)	(0.145)	(0.0991)	(0.155)
65 Years Over	2.485***	2.485***	2.637***	2.637***
	(0.0956)	(0.0841)	(0.101)	(0.0894)
Race	0.367***	0.367*	0.392***	0.392*
	(0.0243)	(0.184)	(0.0258)	(0.195)
Male	1.086***	1.086***	0.973***	0.973***
	(0.0188)	(0.0778)	(0.0200)	(0.0792)
Constant	23.36***	23.36***	24.39***	24.39***
	(0.318)	(1.738)	(0.337)	(1.849)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The regression results from the 2001-2005 pre-recession sample suggest that a one-dollar increase in real minimum wage is associated with a 0.318 decrease in self-reported mean BMI. This result is similar to Meltzer & Chen's findings (a negative relationship between real minimum wage and BMI), however my results were insignificant. Table 4 contains the results from 2007 to 2014.

Table 5: Fixed-effects Regression, 2007-2014

VARIABLES	(1) Self-reported BMI	(2) Self-reported BMI Robust	(3) Measured BMI	(4) Measured BMI Robust
Real Min Wage	0.177***	0.177***	0.188***	0.188***
	(0.0109)	(0.0173)	(0.0116)	(0.0186)
Martial Status (Base: Married)				
Common-Law	-0.238***	-0.238**	-0.252***	-0.252**
	(0.0257)	(0.0835)	(0.0272)	(0.0886)
Widow/Sep/Div	-0.249***	-0.249***	-0.267***	-0.267***
	(0.0193)	(0.0436)	(0.0204)	(0.0463)
Single/Never Mar	-0.317***	-0.317***	-0.344***	-0.344***
	(0.0208)	(0.0769)	(0.0221)	(0.0814)
Edu(Base:< than sec)				
Secondary Grad	-0.338***	-0.338***	-0.360***	-0.360***
	(0.0246)	(0.0373)	(0.0261)	(0.0397)
Other Post-Sec	-0.397***	-0.397***	-0.422***	-0.422***
	(0.0340)	(0.0806)	(0.0361)	(0.0851)
Post-Sec Grad	-0.700***	-0.700***	-0.744***	-0.744***
	(0.0211)	(0.0423)	(0.0224)	(0.0448)
Income(Base: NoInc)				
Less than $20,000	0.275***	0.275**	0.294***	0.294**
	(0.0464)	(0.117)	(0.0492)	(0.123)
$20,000 - $39,000	0.174***	0.174	0.190***	0.190
	(0.0464)	(0.111)	(0.0493)	(0.116)
$40,000 -$59,999	0.179***	0.179**	0.200***	0.200**
	(0.0476)	(0.0673)	(0.0505)	(0.0702)
$60,000-$79,999	0.153***	0.153	0.175***	0.175*
	(0.0500)	(0.0865)	(0.0531)	(0.0908)
$80,000 or more	0.134***	0.134	0.157***	0.157
	(0.0499)	(0.101)	(0.0529)	(0.107)
Age (Base: 18-19yrs)				
20 to 34 Years	2.266***	2.266***	2.412***	2.412***
	(0.0537)	(0.0872)	(0.0570)	(0.0931)
35 to 44 Years	3.400***	3.400***	3.617***	3.617***
	(0.0562)	(0.134)	(0.0596)	(0.143)
45 to 64 years	3.847***	3.847***	4.089***	4.089***
	(0.0543)	(0.127)	(0.0576)	(0.136)
65 Years Over	2.940***	2.940***	3.124***	3.124***
	(0.0554)	(0.0924)	(0.0587)	(0.0987)
Race	0.667***	0.667**	0.711***	0.711**
	(0.0223)	(0.240)	(0.0237)	(0.255)
Male	0.938***	0.938***	0.836***	0.836***
	(0.0151)	(0.0737)	(0.0160)	(0.0741)
Constant	21.13***	21.13***	22.00***	22.00***
	(0.128)	(0.260)	(0.135)	(0.276)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results from the 2007-2014 sample suggest that a one-dollar increase in real minimum wage is associated with a 0.17658 increase in mean self-reported BMI or a 0.188 increase in mean measured BMI. Between 2007 to 2014 average BMI increased from 26.41297 to 26.80801, and average real minimum wage increased from $8.897 to $10.54163. Average BMI increased by 0.39504, and average real minimum wage increased by $1.64463. Multiplying the increase in average real minimum wage by the estimates from the fixed-effect linear regression suggest that a $1.64463 increase in real minimum wage from 2007 to 2014 would produce a $1.64463*0.17658 = 0.2904 increase in BMI. This suggest that real minimum wage contributed 0.2904/0.39504*100 = 73.5% to the increase in BMI between 2007 to 2014.

V. Discussion

The results prior to the Harper government (2001-2005) was insignificant and the result during the Harper government (2007-2014) show a significant positive relationship between real minimum wage and BMI. Meltzer and Chen's causal pathway is a plausible explanation in discussing the relationship between real minimum wage and obesity in response to their findings. However, it does not seem like a plausible explanation to this paper's result since the findings are counter to their results. We will discuss possible explanations for our findings including differences between Canada and the United States, recessionary effects over the Harper government period, impact of minimum wage on food prices, household budget constraints, and arguing against a possible third factor.

Canada and the United States are different. Both Canada and the United States obesity prevalence is increasing, however, Canada's obesity rate is lower and the rate of increase is slower than the United States (OECD 2014). This may be due to the difference in eating behaviors and food availability between Canadians and Americans. Canadians eat roughly twice the amount of fruits and vegetables compare to Americans, and Americans spend more time eating at restaurants (see Richards and Patterson 2005; Brunello , Michaud and Sanz-de-Galdeano 2008). There is a price gap between the same food goods in the United States and Canada. At first, Canadian food prices were generally lower than U.S prices or similar between the mid-1990s to mid-2000s (Li 2014). This could explain why the result between 2001-2005 suggested a negative relationship between real minimum wage and obesity, same as Meltzer & Chen. However, the results were insignificant and might be to due the very small sample period. A future study between the mid-1990s to mid-2000s can help confirm this notion.

During the Harper government period in Canada, the Canadian food prices between 2007-2012 increased almost twice the amount of the all-item Consumer Price Index (Rollin 2015). After the mid-2000's the food price gap between the United States and Canada grew larger. By 2012, for a similar set of food goods, there was a 57 percent cost difference, accounting for the exchange rate (Li 2014). Americans spend more of their food expenditures away from home compared to Canadians. From 2001 to 2012, FAFH as a share of U.S. household food expenditures increased from 40 percent to 43.1 percent (Lin 2014). According to the U.S. Bureau of Labor Statistics (2012), in 2009 Americans spend more on FAFH (6% of their total household expenditure) than

Canadians (3.7%) whereas Canadians spend more on FAH (11.6%) than Americans (8.6%).

The food industry employs the most amount of Canadians compare to other industries, and a majority are earning minimum wage since the average wage is under $18,000 per year (Grant, et al. 2011). Li (2014) noted that the lack of competition and supply-management policies are responsible for the large price gaps, however, wages can also play a factor since Canada's real minimum wage has always been higher than the United States. Food consumption is less susceptible during the recession because consumers still have to eat, so they substituted food spending in restaurants to dining at home (Grant, et al. 2011). This suggests that Canadians substitute to FAH when both prices for FAFH and FAH increases. Recall that FAFH is price and income elastic compare to FAH which is price and income inelastic (Piggott 2003).

In addition, consumers do not necessarily substitute FAFH with healthy FAH options (Todd, Mancino and Lin 2010). It is likely that the increase in real minimum wage caused an increase in both FAFH and FAH prices. It's plausible that Canadians substituted FAFH for unhealthy FAH options because they have a longer shelf especially in a time of rising food prices. Unhealthy FAH contains unhealthy fats, sugars, and carbohydrates, which may increase caloric intake and BMI levels thus explaining the positive statistically significant causal relationship between real minimum wage and BMI in this study.

As Meltzer and Chen (2011) suggested there could also be a third factor influencing both real minimum wage and obesity. Mallicoat (2015) conduct a similar study examining the impact of real minimum wage on obesity prevalence between 2007 to 2012. His findings concluded that a one-dollar increase in real minimum wage is associated with a 0.44-unit increase in obesity prevalence. His findings are also opposite to Meltzer and Chen, and explains that this may be due to methodological differences, recessionary effects and a possible third factor; income inequality.

Using inequality data from the United Nation and obesity data from International Obesity Task Force, Wilkinson and Pickett (2011) test the relationship between income inequality and obesity and concluded a positive correlation between the two. They explain that countries with high-income inequality experience more stress, and eat more to distract from the stress. However, there are many criticisms against their findings. The overall consensus suggests that Wilkinson and Pickett manipulated the data to support their thesis by either including or not including certain data points. For example, Saunders (2010) pointed out when Wilkinson and Pickett examined income inequality and obesity, they removed the United States data from the analysis in order to conclude a significant association. If United States was included, Sauder found that there was no association.

In addition, Wilkinson and Pickett only looked at the R-Square when analyzing for statistical significance, and it doesn't necessarily indicate that the model has a good fit. The authors did not control for any cofounding factors in the regression analysis and as Snowdon (2010) pointed out that race is a major cofounder when it comes to studying inequality. Wilkinson and Pickett failed to realize that correlation does not mean

causation, and their main thesis suggest that inequality affects many health and social problems. Many studies tried to re-conduct Wilkinson and Pickett's study, and were all unable to come to the same statistical conclusion and found that there was no association between income equality and obesity (see Sanandaji, et al. 2010; Saunders 2010; Snowdon 2010).

The evidence on the effects of income inequality on minimum wage is also weak. Wilkinson and Pickett (2011) suggest that income inequality can be reduced by stopping corporate tax loopholes, increasing high-income tax rates, and legislation to limit pay bonuses. By implementing these, it may cause a shift in financial power and political power. The rich and wealthy have fought politically to keep them as wealthy and powerful as possible, and with the shift in political power, the minimum wage may increase. There is a lack of studies to confirm this theory.

In 2006, there was a shift in political power in Canada. Stephen Harper became the Primer Minister branding the Government of Canada as the Harper government. There were many policy changes that were implemented by the Harper government that may also explain the differences between my results and Meltzer and Chen's. Some policy changes included the Temporary Foreign Work Program, and elimination of the Fair Wage Act which changed the Canada's labour markets. The C-38 bill was also introduced which cut health care funding and jobs. However, this is only a light exploration into the policies implemented during the time of the Harper government, and were not tested for.

There are literatures that examine the effect of minimum wage on income inequality (see Lee 1999; DiNardo, Fortin and Lemieux 1996). Most recent study suggests that the significance of minimum wage on inequality is substantially smaller than previous studies and that minimum wage is a contributing factor to widening the lower tail inequality especially for females, but it was not the primary one (Autor, Manning and Smith 2016). It is unknown whether the relationship also runs the other way. The evidence that income inequality is a possible third factor that could influence both minimum wage and BMI levels is weak. More studies need to be conducted to test the hypothesis of the influence of income inequality and obesity, as well as the influence of income inequality and minimum wage.

There is a significant positive relationship between the changes in real minimum wage and the changes BMI in Canada. There are two likely explanations for this relationship. First, it is driven by the effects of the recession over the Harper government period. Second, involves around the impact that minimum wage has on food prices, and the household budget constraint between FAFH and FAH. I suggest that the causal pathway in this study is as such. Increases in real minimum wage increase both FAFH and FAH prices. Consumers still have to eat, and may substitute from FAFH to FAH. FAH options may be unhealthy and no better or worse than FAFH, contributing to the increase in BMI levels.

VI. Limitations

There are several limitations in this study. The CCHS was not conducted in 2006, therefore there is a year gap between the 2001-2014 regression. It is unlikely that it will change the overall findings since obesity prevalence steadily increased between 2005 to 2007[9] and real minimum wage generally moved in the same direction across provinces/territories[10].

There were many policy changes that were implemented by the Harper government that may have explained the differences in results, which I did not test for. A further investigation into policy changes during the Harper government, may deepen our understanding of the relationship between real minimum wage and body mass index levels in Canada.

The body weight and height information provided by the CCHS is self-report, which may lead to biases in the estimate of BMI. The regression results between self-reported and calculated measured BMI is minimal. In additional, there are some concerns with regards to its accuracy to detect excess body fat[11], but BMI is a common and widely used to measure obesity.

[9] See Chart 2 from Statistics Canada "*Overweight and obese adults (self-reported), 2014* . November 27. Accessed March 1, 2016. http://www.statcan.gc.ca/pub/82-625-x/2015001/article/14185-eng.htm.

[10] See Figure 1

[11] See Romero-Corral, Abel , Virend K Somers, Justo Sierra-Johnson, Randal J. Thomas, Kent R Bailey , Maria L Collazo-Clavell, Thomas Allison, Josef Korinek, John A Batsis , and Francisco Lopez-Jimenez. 2008. "Accuracy of Body Mass Index to Diagnose Obesity In the US Adult Population." *International Journal of Obesity* 959–966.

VII. Bibliography

Ásgeirsdóttir, Tinna Laufey , Hope Corman, Kelly Noonan , and Nancy E Reichman. 2016. "Lifecycle effects of a recession on health behaviors: Boom, bust, and recovery in Iceland." *Economics & Human Biology* 90–107.

Aaronson, Daniel , Eric French , and James MacDonald . 2008. "The Minimum Wage, Restaurant Prices, and Labor Market Structure." *The Journal of Human Resources* 43: 688-720.

Aaronson, Daniel. 2001. "Price Pass-Through and the Minimum Wage." *The Review of Economics and Statistics* 158-169.

Anderson, Michael L, and David A Matsa. 2011. "Are Restaurants Really Supersizing America?" *American Economic Journal: Applied Economics* 3 (1): 152-88.

Andreyeva, Tatiana, Michael Long, and Kelly Brownell. 2010. "The Impact of Food Prices on Consumption: A Systematic Review of Research on the Price Elasticity of Demand for Food." *American Journal of Public Health* 216-222.

Autor, David H, Alan Manning, and Christopher L Smith . 2016. "The Contribution of the Minimum Wage to US Wage Inequality over Three Decades: A Reassessment." *American Economic Journal: Applied Economics* 58–99.

Böckerman, Petri, Edvard Johansson, Sata Helakorpi, Ritva Prättälä, Erkki Vartiainen , and Antti Uutela . 2004. "Does a Slump Really Make You Thinner? Finnish Micro-Level Evidence 1978-2002." *Research Institute of the Finnish Economy Discussion Paper No. 928.*

Barsky , Robert , and Gary Solon. 1988. "Real Wages over the Business Cycle." *NBER working paper 2888.*

Binkley, J K, J Eales, and M Jekanowski. 2000. "The relation between dietary change and rising US obesity." *International Journal of Obesity* 24 (8): 1032– 39.

Bowman, S A, and B T Vinyard. 2004. "Fast food consumption of U.S. adults: impact on energy and nutrient intakes and overweight status." *Journal of the American College of Nutrition* 23 (2): 163–168.

Brunello , Giorgio , Pierre-Carl Michaud , and Anna Sanz-de-Galdeano. 2008. "The Rise in Obesity Across the Atlantic: An Economic Perspective." *Working Paper 2008-21.*

Chang, Virginia , and Diane S Lauderdale. 2005. "Income Disparities in Body Mass Index and Obesity in the United States, 1971-2002." *Arch Intern Med* 2122-8.

Chou, Shin-Yi , Inas Rashad, and Michael Grossman. 2008. "Fast-Food Restaurant Advertising on Television and Its Influence on Childhood Obesity." *Journal of Law & Economics* 599-618.

Chou, Shin-Yi, Michael Grossman, and Henry Saffer . 2004. "An economic analysis of adult obesity: results from the Behavioral Risk Factor Surveillance System." *Journal of Health Economics* 23 (3): 565–587.

Colman, Gregory J, and Dhaval M Dave. 2011. "Exercise, physical activity, and exertion over the business cycle." *NBER Working Paper No. 17406.*

Colman, Gregory J, and Dhaval M Dave. 2013. "Physical Activity and Health." *NBER Working Paper No. 18858.*

Cotti , Chad, and Nathan Tefft . 2013. "Fast food prices, obesity, and the minimum wage." *Economics and Human Biology* 134–147.

Cross , Philip , and Philippe Bergevin. 2012. *Turning Points: Business Cycles in Canada since 1926.* C.D. Howe Institute, Toronto: C.D. Howe Institute.

Currie, Janet, Stefano DellaVigna, Enrico Moretti, and Vikram Pathania. 2010. "The Effect of Fast Food Restaurants on Obesity." *American Economic Journal: Economic Policy, American Economic Association* 32-63.

Cutler , David M, Edward L Glaeser, and Jesse M Shapiro. 2003. "Why have Americans Become More Obese? ." *Journal of Economic Perspectives* 93-118.

Dave, Dhaval M, and Inas Rashad Kelly. 2012. "How does the business cycle affect eating habits?" *Social Science & Medicine* 254-262.

DiNardo, John, Nicole M Fortin, and Thomas Lemieux. 1996. "Labor Market Institutions and the Distribution of Wages, 1973–1992: A Semiparametric Approach." *Econometrica* 1001–44.

Drewnowski, A. 1995. "Energy intake and sensory properties of food." *American Journal of Clinical Nutrition* 1081S-1085S.

Dustmann , Christian , and Frank Windmeijer. 2000. "Wages and the Demand for Health – A Life Cycle Analysis*." *IZA Discussion Paper No. 171.*

French, S A, L Harnack, and R W Jeffery. 2000. "Fast food restaurant use among women in the Pound of Prevention study: dietary, behavioral and demographic correlates." *International Journal of Obesity* 24 (10): 1353–1359.

Furchtgott-Roth, Diana . 2015. "Raising the Minimum Wage for Fast-Food Workers." *Economic Policies for the 21st Policy at the Manhattan Institute* . June 22. Accessed March 1, 2016. http://www.economics21.org/files/pdf/Wage%20Board%20Testimony%20062015.pdf.

Galarneau , Diane , and Eric Fecteau. 2016. *The ups and downs of minimum wage.* March 3. http://www.statcan.gc.ca/pub/75-006-x/2014001/article/14035-eng.htm#n3.

Gorber, Sarah Connor , Margot Shields, Mark S Tremblay , and Ian McDowell. 2008. "The feasibility of establishing correction factors to adjust self-reported estimates of obesity." *Component of Statistics Canada Catalogue no. 82-003-X Health Reports*, September: 71-82.

Goverment of Canada . 2016. *Goverment of Canada* . March 1. http://srv116.services.gc.ca/rpt2.aspx?lang=fra&dec=5.

Government of Canada . 2016. *Work - Employment Rate.* February 1. http://well-being.esdc.gc.ca/misme-iowb/.3ndic.1t.4r@-eng.jsp?iid=13.

Government of Canada. 2014. *Hourly Minimum Wages in CANADA for Adult Workers.* March 1. http://srv116.services.gc.ca/rpt2.aspx?lang=eng&dec=5.

Grant, Michael, Michael Bassett, Matthew Stewart, and Julie Adès. 2011. *Valuing Food: The Economic Contribution of Canada's Food Sector.* Centre for Food in Canada , The Conference Board of Canada, Canada: The Conference Board of Canada.

Hanes, Christopher . 1996. "Changes in the Cyclical Behavior of Real Wage Rates, 1870-1990." *The Journal of Economic History* 837-861.

Jekanowski, Mark , James K Binkley, and James Eales. 2001. "Convenience, Accessibility, and the Demand for Fast Food." *Journal ofAgricultural and Resource Economics* 58-74.

Kirkpatrick , Sharon , and Valerie Tarasuk. 2003. "The relation between low income and household food expenditure patterns in Canada." *Public Health Nutrition* 589–597.

Kpelitse, Koffi-Ahoto , Rose Anne Devlin, and Sisira Sarma. 2014. "The Effect of Income on Obesity among Canadian Adults." Vers. Working Paper No: 2014-C02. *Canadian Centre for Health Economics.* August 20. Accessed March 1, 2016. http://www.canadiancentreforhealtheconomics.ca/papers/effect-income-obesity-among-canadian-adults/.

Lee, David S. 1999. "Wage Inequality in the United States During the 1980s: Rising Dispersion or Falling Minimum Wage?" *Quarterly Journal of Economics* 977–1023.

Li , Nicholas . 2014 . "Sticker Shock: The Causes of the Canada-US Price Differential." *C.D. Howe Institute Commentary*, May : Commentary No. 409.

Lin, Biing-Hwan . 2014. *Food-Away-from-Home.* October 29. http://www.ers.usda.gov/topics/food-choices-health/food-consumption-demand/food-away-from-home.aspx.

MacDonald, James M, and Daniel Aaronson . 2006. "How Firms Construct Price Changes: Evidence from Restaurant Responses to Increased Minimum Wages ." *American Journal of Agricultural Economics* 292-307.

Mallicoat, Benjamin C. 2015. "The Impact of Minimum Wage Rates on Obesity in the United States during the Great Recession." *University of Tennessee Honors Thesis Projects.* http://trace.tennessee.edu/utk_chanhonoproj/1841.

Meltzer, David O, and Zhuo Chen. 2011. "The Impact of Minimum Wage Rates on Body Weight in the United States." In *National Bureau of Economic Research Book - Economic Aspects of Obesity*, edited by Michael Grossman and Naci H Mocan, 17-34. Chicago: University of Chicago Press.

Messina, Julián , Chiara Strozzi , and Jarkko Turunen . 2009. "Real wages over the business cycle: OECD evidence from the time and frequency domains." *Journal of Economic Dynamics and Control* 1183–1200.

OECD . 2014. *Obesity and the Economics of Preventation: Fit not Fat Key Facts - Canada Update 2014.* OECD, Canada: OECD.

Organization for Economic Co-operation and Development. 2014. *OCED.* June. Accessed March 1, 2016. http://www.oecd.org/health/Obesity-Update-2014.pdf.

Phaneuf, Louis , Zheng Liu, and Kevn X.D Huang. 2004. "Why Does the Cyclical Behavior of Real Wages Change over Time?" *The American Economic Review* 836-856.

Philipson, Tomas J, and A Richard Posner. 1999. "The Long Run Growth of Obesity as a Function of Technological Change." *Perspectives in Biology and Medicine* 87-108.

Piggott, Nicholas E. 2003. "The Nested PIGLOG Model: An Application to U.S. Food Demand." *American Journal of Agricultural Economics* 85: 1-15.

Powell, Lisa. 2009. "Fast food costs and adolescent body mass index: evidence from panel data." *Journal of Health Economics* 963-970.

Richards, Timothy J, and Paul M Patterson. 2005. "A Bilateral Comparison of Fruit and Vegetable Consumption: United States and Canada." *Journal of Agricultural and Resource Economics* 333-349 .

Rollin, Anne-Marie. 2015. "The Increase in Food Prices Between 2007 and 2012." *Statistic Canada* . November 27. http://www.statcan.gc.ca/pub/11-626-x/11-626-x2013027-eng.htm.

Romero-Corral, Abel , Virend K Somers, Justo Sierra-Johnson, Randal J. Thomas, Kent R Bailey , Maria L Collazo-Clavell, Thomas Allison, Josef Korinek, John A Batsis , and Francisco Lopez-Jimenez. 2008. "Accuracy of Body Mass Index to Diagnose Obesity In the US Adult Population." *International Journal of Obesity* 959–966.

Ruhm, Christopher J. 2000. "Are Recessions Good For Your Health?" *Quarterly Journal of Economics* 617-650.

Ruhm, Christopher J. 2005. "Healthy Living in Hard Times ." *Journal of Health Economics* 341-363.

Ruhm, Christopher J. 2012. "Understanding Overeating and Obesity ." *Journal of Health Economics* 781– 796.

Sanandaji, Nima, Tino Sanandaji, Arvid Malm , and Christopher Snowdown . 2010. *Un-Level Ground.* July 9. http://www.wsj.com/articles/SB127862421912914915.

Saunders, Peter . 2010. *Beware False Prophets Equality, the Good Society and The Spirit Level.* Policy Exchange, London : Clutha House.

Snowdon , Christopher John . 2010. *The Spirit Level Delusion: Fact-Checking the Left's New Theory of Everything.* Democracy Institute/Little Dice.

Solon, Gary , Robert Barsky, and Jonathan A Parker. 1994. "Measuring the Cyclicality of Real Wages: How Important is Composition Bias." *Quarterly Journal of Economics* 1-25.

Statistics Canada . 2016. *Consumer Price Index, historical summary, by province or territory.* January 22. http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ150c-eng.htm.

—. 2015. *Overweight and obese adults (self-reported), 2014* . November 27. Accessed March 1, 2016. http://www.statcan.gc.ca/pub/82-625-x/2015001/article/14185-eng.htm.

—. 2015. *Statistics Canada* . April 20 . http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3226.

Statistics Canada . 2016. *Survey of household spending (SHS), household spending, by household type* . April 6. http://www5.statcan.gc.ca/cansim/a05?lang=eng&id=2030023.

Statistics Canada. 2016. *Table 282-0087 - Labour force survey estimates (LFS), by sex and age group, seasonally adjusted and unadjusted, monthly (persons unless otherwise noted).* May 8. http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=2820087&&pattern=&stByVal=1&p1=1&p2=37&tabMode=dataTable&csid=.

Tapp, Stephen . 2009. "Canadian Labour Market Developments: Recession Impacts, Recent Trends and Future Outlook." *Office of the Parliamentary Budget Officer.* July 6. http://www.parl.gc.ca/PBO-DPB/documents/Canadian_Labour_Market_Developments_-_July_2009.pdf.

The Economist . 2012. *Eating and Recession: The basket case* . June 23. http://www.economist.com/node/21557377.

Todd, Jessica E, Lisa Mancino, and Biing-Hwan Lin. 2010. *The Impact of Food Away From Home on Adult Diet Quality.* United States Department of Agriculture,

Economic Research Report Number 90, United States: Economic Research Service.

Twells , Laurie K, Deborah M Gregory, Jacinta Reddigan, and William K Midodzi. 2014. "Current and predicted prevalence of obesity in Canada: a trend analysis." *CMAJ Open* E18-E26.

U.S. Bureau of Labor Statistics. 2012. "Consumer Expenditure Survey ." *Focus on Prices and Spendings* , March .

Wen, You, Ge Zhang , Brenda M Davy, Andrea Carlson , and Biing-Hwan Lin. 2009. "Food Consumed Away from Home Can Be a Part of a Healthy and Affordable Diet." *The Journal of Nutrition* 139 (10): 1994-1999.

Wilkinson, Richard , and Kate Pickett. 2011. *The Spirit Level: Why More Equal Societies Almost Always Do Better.* Bloomsbury Press.

Worldwide Inflation Data . 2016. *Historic inflation Canada - CPI inflation.* http://www.inflation.eu/inflation-rates/canada/historic-inflation/cpi-inflation-canada.aspx.

Zhang, Qi , Rajan Lamichhane, and Youfa Wang. 2014. "Associations between U.S. Adult Obesity and State and County Economic Conditions in the Recession." *Journal of Clinical Medicine* 153–166.